MITSUBISHI

Digital-Analog Converter Module

Mitsubishi
General-Purpose PROGRAMMABLE LOGIC CONTROLLER

User's Manual
(Hardware)

Q62DAN
Q64DAN
Q68DAVN
Q68DAIN

Thank you for purchasing the Mitsubishi general-purpose programmable logic controller MELSEC-Q Series

Prior to use, please read this manual thoroughly and familiarize yourself with the product.

MELSEC
Mitsubishi Programmable Logic Controller

MODEL	Q-D/A-N-U-H/W
MODEL CODE	13JP80
IB(NA)-0800321-A(0508)MEE	

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● SAFETY PRECAUTIONS ●

(Read these precautions before using.)

When using Mitsubishi equipment, thoroughly read this manual and the associated manuals introduced in the manual. Also pay careful attention to safety and handle the module properly.
These precautions apply only to Mitsubishi equipment. Refer to the user's manual of the CPU module to use for a description of the PLC system safety precautions.
These "SAFETY PRECAUTIONS" classify the safety precautions into two categories: "DANGER" and "CAUTION".

DANGER	Procedures which may lead to a dangerous condition and cause death or serious injury, if not carried out properly.
CAUTION	Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

Depending on circumstances, procedures indicated by **CAUTION** may also be linked to serious results.
In any case, it is important to follow the directions for usage.
Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

[DESIGN PRECAUTIONS]

CAUTION

- Do not bunch the control wires or communication cables with the main circuit or power wires, or install them close to each other. They should be installed 100 mm (3.94 inch) or more from each other. Not doing so could result in noise that may cause malfunction.
- At power ON/OFF, voltage or current may instantaneously be output from the output terminal of this module. In such case, wait until the analog output becomes stable to start controlling the external device.

[INSTALLATION PRECAUTIONS]

⚠CAUTION

- Use the PLC in an environment that meets the general specifications given in the User's Manual of the CPU module being used.
  Using this PLC in an environment outside the range of the general specifications may cause electric shock, fire, malfunction, and damage to or deterioration of the product.
- When installing the module, securely insert the module fixing tabs into the mounting holes of the base unit while pressing the installation lever located a t the bottom of the module downward.
  Improper installation may result in malfunction , breakdown or the module coming loose and dropping.
  Securely fix the module with screws if it is subject to vibration during use.
- Tighten the screws within the range of specified torque.
  If the screws are loose, it may cause the module to fallout, short circuits, or malfunction.
  If the screws are tightened too much, it may cause damage to the screw and/or the module, resulting in fallout, short circuits or malfunction.
- Be sure to shut off all phases of the external power supply used by the system before mounting or removing the module.
  Not doing so may cause damage to the module.
- Do not directly touch the conductive area or electronic components of the module.
  Doing so may cause malfunction or failure in the module.

[WIRING PRECAUTIONS]

⚠CAUTION

- Always ground the FG terminal for the PLC.
  There is a risk of electric shock or malfunction.
- When turning on the power and operating the module after wiring is completed, always attach the terminal cover that comes with the product.
  There is a risk of electric shock if the terminal cover is not attached.
- Tighten the terminal screws within the range of specified torque.
  If the terminal screws are loose, it may result in short circuits or malfunction.
  If the terminal screws are tightened too much, it may cause damage to the screw and/or the module, resulting in short circuits or malfunction.
- Be careful not to let foreign matters such as sawdust or wire chips get inside the module.
  These may cause fires, failure or malfunction.
- The top surface of the module is covered with protective film to prevent foreign objects such as cable offcuts from entering the module when wiring.
  Do not remove this film until the wiring is complete.
  Before operating the system, be sure to remove the film to provide adequate heat ventilation.

REVISIONS

* The manual number is given on the bottom right of the top cover.

Print Date	*Manual Number	Revision
Aug.,2005	IB(NA)-0800321-A	First edition

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About the Manuals

The following manuals are related to this product.
Referring to this list, please request the necessary manuals.

Detailed Manual

Manual Name	Manual Number (Model Code)
Digital-Analog Converter Module User's Manual Q62DAN/Q64DAN/Q68DAVN/Q68DAIN/Q62DA/ Q64DA/Q68DAV/Q68DAI/GX Configurator-DA (SW2D5C-QDAU-E)	SH-080054 (13JR02)

Conformance to the EMC Directive/Low Voltage Directive

When incorporating the Mitsubishi PLC into other machinery or equipment and keeping compliance with the EMC and low voltage directives, refer to Chapter 3, "EMC Directives and Low Voltage Directives" of the User's Manual (Hardware) included with the CPU module or base unit used.
The CE logo is printed on the rating plate on the main body of the PLC that conforms to the EMC directive and low voltage instruction.
By making this product conform to the EMC directive and low voltage instruction, it is not necessary to make those steps individually.

1. Overview

This manual explains specifications and the names of the components for the following modules which are used in combination with the MELSEC-Q Series CPU module.

- the Q62DAN type D/A converter module (hereafter Q62DAN)
- the Q64DAN type D/A converter module (hereafter Q64DAN)
- the Q68DAVN type D/A converter module (hereafter Q68DAVN)
- the Q68DAIN type D/A converter module (hereafter Q68DAIN)

In this manual, the Q62DAN, Q64DAN, Q68DAVN and Q68DAIN are referred to as D/A converter modules.

After unpacking, confirm that the following products are enclosed.

Model code	Product name	Quantity
Q62DAN	Q62DAN Model Digital-Analog Converter module	1
Q64DAN	Q64DAN Model Digital-Analog Converter module	1
Q68DAVN	Q68DAVN Model Digital-Analog Converter module	1
	FG terminal L-Shaped metal fitting	1
Q68DAIN	Q68DAIN Model Digital-Analog Converter module	1
	FG terminal L-Shaped metal fitting	1

2. Specifications

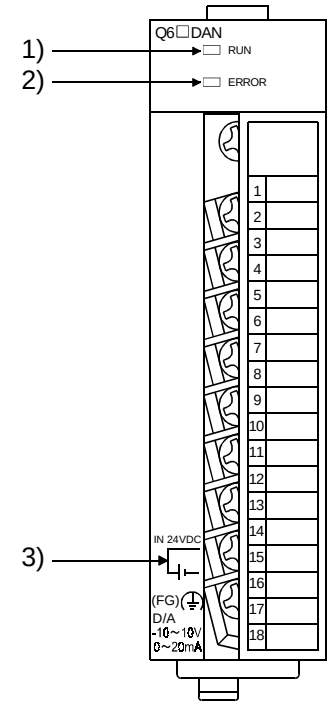
The specifications for the D/A converter module are shown in the following table. For general specifications, refer to the operation manual for the CPU module being used.

<table>
<tr><th colspan="3">Item \ Model name</th><th>Q62DAN</th><th>Q64DAN</th><th>Q68DAVN</th><th>Q68DAIN</th></tr>
<tr><td colspan="3">Number of analog output points</td><td>2 points (2 channels)</td><td>4 points (4 channels)</td><td colspan="2">8 points (8 channels)</td></tr>
<tr><td colspan="3">Digital input</td><td colspan="4">16-bit signed binary (normal resolution mode: -4096 to 4095, high resolution mode: -12288 to 12287, -16384 to 16383)</td></tr>
<tr><td rowspan="2">Analog output</td><td colspan="2">Voltage</td><td colspan="2">–10 to 10 V DC (External load resistance value: 1 kΩ to 1MΩ)</td><td colspan="2">—</td></tr>
<tr><td colspan="2">Current</td><td colspan="2">0 to 20 mA DC (External load resistance value: 0Ω to 600Ω)</td><td>—</td><td>0 to 20 mA DC (External load resistance value: 0Ω to 600Ω)</td></tr>
<tr><td colspan="3">I/O characteristics, Maximum resolution</td><td colspan="4">
<table>
<tr><th colspan="2" rowspan="2">Analog output range</th><th colspan="2">Normal resolution mode</th><th colspan="2">High resolution mode</th></tr>
<tr><th>Digital input value</th><th>Maximum resolution</th><th>Digital input value</th><th>Maximum resolution</th></tr>
<tr><td rowspan="4">Voltage</td><td>0 to 5V</td><td rowspan="2">0 to 4000</td><td>1.25 mV</td><td rowspan="2">0 to 12000</td><td>0.416 mV</td></tr>
<tr><td>1 to 5V</td><td>1.0 mV</td><td>0.333 mV</td></tr>
<tr><td>-10 to 10V</td><td rowspan="2">-4000 to 4000</td><td>2.5 mV</td><td>-16000 to 16000</td><td>0.625 mV</td></tr>
<tr><td>User range setting</td><td>0.75 mV</td><td>-12000 to 12000</td><td>0.333 mV</td></tr>
<tr><td rowspan="3">Current</td><td>0 to 20 mA</td><td rowspan="2">0 to 4000</td><td>5 μA</td><td rowspan="2">0 to 12000</td><td>1.66 μA</td></tr>
<tr><td>4 to 20 mA</td><td>4 μA</td><td>1.33 μA</td></tr>
<tr><td>User range setting</td><td>-4000 to 4000</td><td>1.5 μA</td><td>-12000 to 12000</td><td>0.83 μA</td></tr>
</table>
</td></tr>
<tr><td rowspan="2">Accuracy (Accuracy in respect to maximum analog output value)</td><td>Ambient temperature 25 ± 5 °C</td><td colspan="4">Within ± 0.1 % (Voltage: ±10 mV, Current: ± 20 μA)</td></tr>
<tr><td>Ambient temperature 0 to 55 °C</td><td colspan="4">Within ± 0.3 % (Voltage: ± 30 mV, Current: ± 60 μA)</td></tr>
<tr><td colspan="3">Conversion speed</td><td colspan="4">80 μs/channel</td></tr>
<tr><td rowspan="2">Absolute maximum output</td><td colspan="2">Voltage</td><td colspan="3">± 12 V</td><td>—</td></tr>
<tr><td colspan="2">Current</td><td colspan="2">21 mA</td><td>—</td><td>21 mA</td></tr>
<tr><td colspan="3">E²PROM write count</td><td colspan="4">Max. 100 thousand times</td></tr>
<tr><td colspan="3">Output short circuit protection</td><td colspan="4">Available</td></tr>
</table>

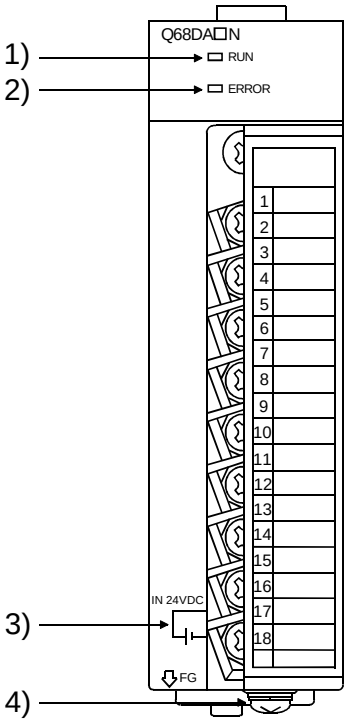
Item \ Model name	Q62DAN	Q64DAN	Q68DAVN	Q68DAIN
Insulation method	Between the I/O terminal and PLC power supply : Photocoupler isolation Between output channels : No isolation Between external supply power and analog output : Transformer isolation			
Dielectric withstand voltage	Between the I/O terminal and PLC power supply : 500VAC for 1 minute Between external supply power and analog output : 500VAC for 1 minute			
Insulation resistance	Between the I/O terminal and PLC power supply : 500VDC 20MΩ or more Between external supply power and analog output : 500VDC 20MΩ or more			
I/O occupied points	16 points (I/O assignment: Intelligent 16 points)			
Connected terminals	18-points terminal block			
Applicable wire size	0.3 to 0.75 mm^2			
Applicable solderless terminal	R1.25-3 (A solderless terminal with sleeve cannot be used)		FG terminal: R1.25-3, 1.25-YS3, RAV1.25-3, V1.25-YS3A Other terminals than FG: R1.25-3 (A solderless terminal with sleeve cannot be used)	
External supply power	24 V DC + 20 %, – 15 %			
	Ripple, spike 500 mV P-P or less			
	Inrush current: 2.5 A, within 250 μs	Inrush current: 2.5 A, within 260 μs	Inrush current: 2.5 A, within 230 μs	Inrush current: 2.5 A, within 230 μs
	0.15 A	0.24 A	0.20 A	0.27 A
Internal current consumption (5 V DC)	0.33 A	0.34 A	0.38 A	0.38 A
Weight	0.19 kg	0.20 kg	0.20 kg	0.20 kg

3. Part Names

This section explains the names of the components for the D/A conversion module.



Terminal number	Signal name			
	Q62DAN		Q64DAN	
1	CH1	V+	CH1	V+
2		COM		COM
3		I+		I+
4	Vacant		Vacant	
5	CH2	V+	CH2	V+
6		COM		COM
7		I+		I+
8	Vacant		Vacant	
9	Vacant		CH3	V+
10	Vacant			COM
11	Vacant			I+
12	Vacant		Vacant	
13	Vacant		CH4	V+
14	Vacant			COM
15	Vacant			I+
16	24 V			
17	24 G			
18	FG			



Terminal number	Signal name			
	Q68DAVN		Q68DAIN	
1	CH1	V+	CH1	I+
2		COM		COM
3	CH2	V+	CH2	I+
4		COM		COM
5	CH3	V+	CH3	I+
6		COM		COM
7	CH4	V+	CH4	I+
8		COM		COM
9	CH5	V+	CH5	I+
10		COM		COM
11	CH6	V+	CH6	I+
12		COM		COM
13	CH7	V+	CH7	I+
14		COM		COM
15	CH8	V+	CH8	I+
16		COM		COM
17	24 V			
18	24 G			

Number	Name	Description
1)	RUN LED	Displays the operating status of the D/A converter module. On : Normal operation Flashing : During offset/gain setting mode Off : 5V power supply interrupted or watch dog timer error
2)	ERROR LED	Displays the error status of the D/A converter module. On : Error Off : Normal operation Flashing : Error in switch settings Switch No. 5 of the intelligent function module has been set to a value other than "0".
3)	External power supply terminal	This is the terminal for connecting the 24 V DC external power supply.
4)	FG terminal	Terminal for frame ground

4. Handling Precautions

(1) Do not drop the module or cause it to receive strong impact.
(2) Tighten the terminal screws for the module to the specified torque shown below.
Insufficient tightening torque could result in shorts, failures or malfunction.

Screw location	Tightening torque
Module mounting screw (M3 screw)	0.36 to 0.48 N·m
Terminal block terminal screw (M3 screw)	0.42 to 0.58 N·m
Terminal block mounting screw (M3.5 screw)	0.66 to 0.89 N·m
FG terminal screw (M3 screw) *	0.42 to 0.58 N·m

* Q68DAVN, Q68DAIN only

5. Wiring

5.1 Wiring precautions

In order to optimize the functions of the D/A converter module and ensure system reliability, external wiring that is protected from noise is required. Please observe the following precautions for external wiring:

(1) Use separate cables for the AC control circuit and the external input signals of the D/A converter module to avoid the influence of the AC side surges and inductions.

(2) Do not mount the cables close to or bundle them with the main circuit line, a high-voltage cable or a load cable from other than the PLC. This may increase the effects of noise, surges and induction.

(3) Perform a one-point grounding for shielded lines and the shields of sealed cables.

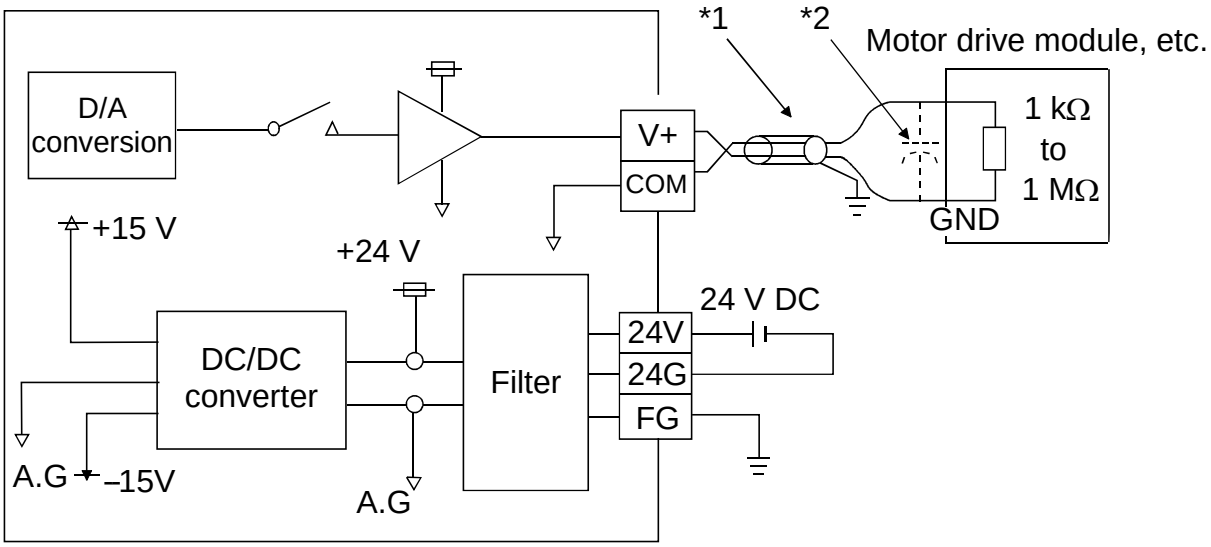
(4) A solderless terminal with insulating sleeve cannot be used for the terminal block. Covering the cable- connection portion of the solderless terminal with a marked tube or an insulation tube is recommended.

Point
When using Q68DAVN or Q68DAIN, If it is difficult to wire FG terminals due to the limited installation space, use FG terminal L-shaped metal fitting.

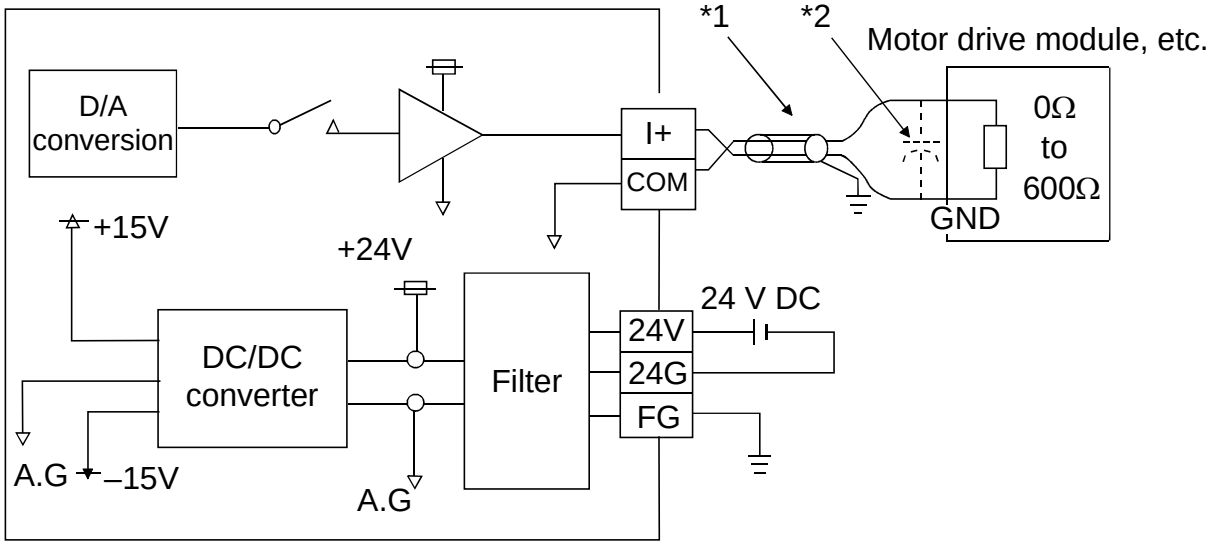
5.2 External wiring

(1) For Q62DAN and Q64DAN

(a) For voltage output

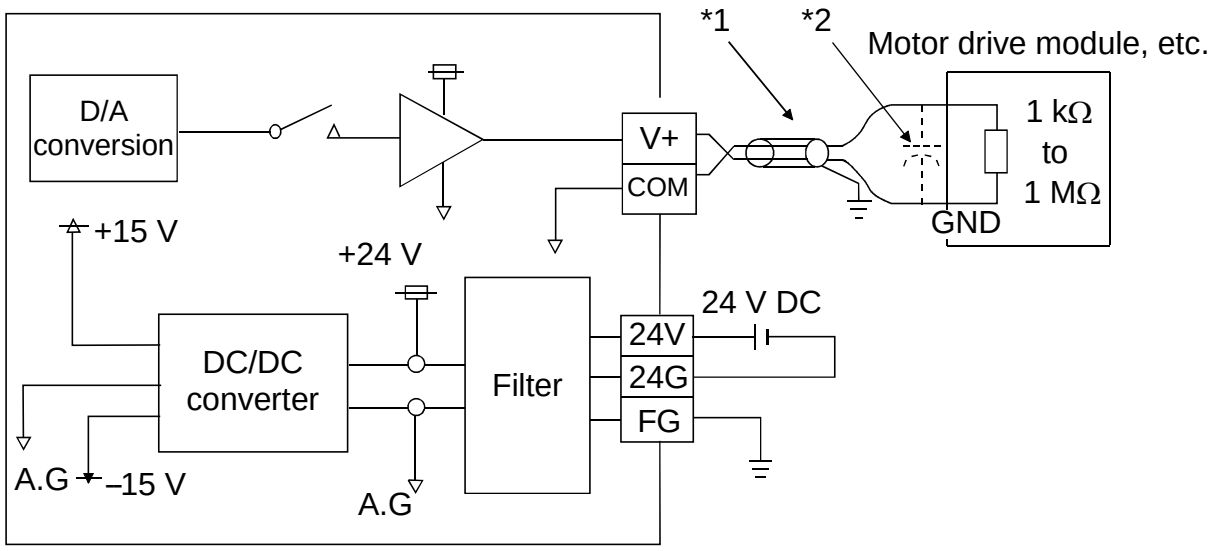


(b) For current output

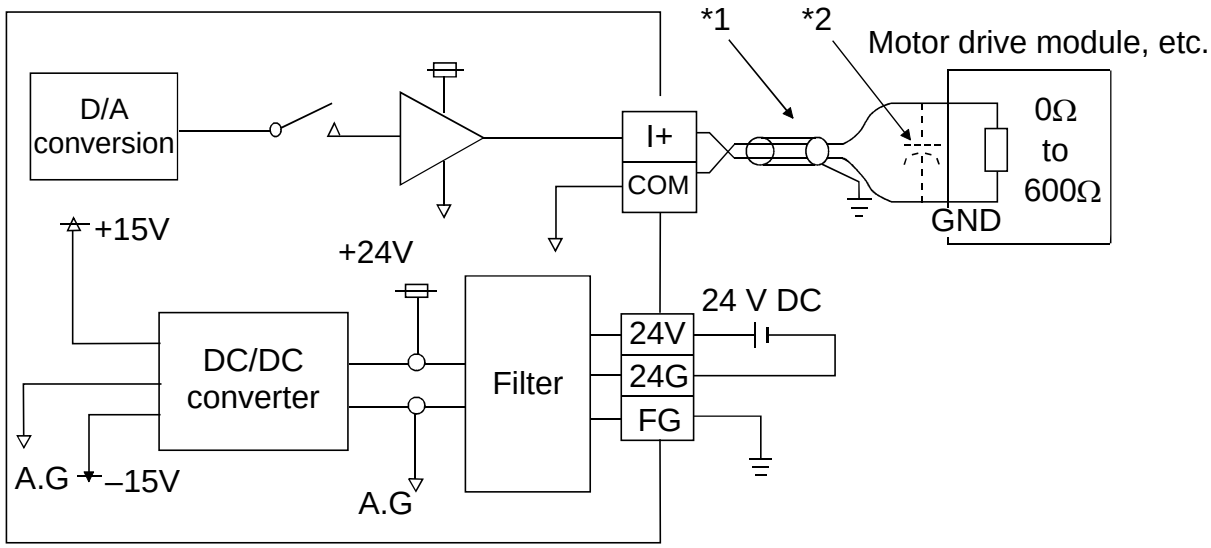


*1 Use a twisted two core shielded wire for the power wire.
*2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47μF25V condenser between the V+/I+ terminal and COM.

(2) For Q68DAVN



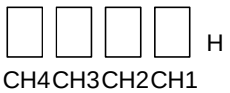
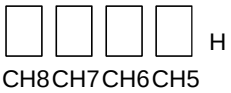
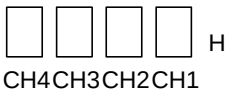
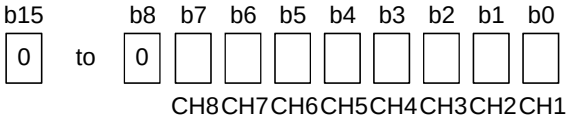
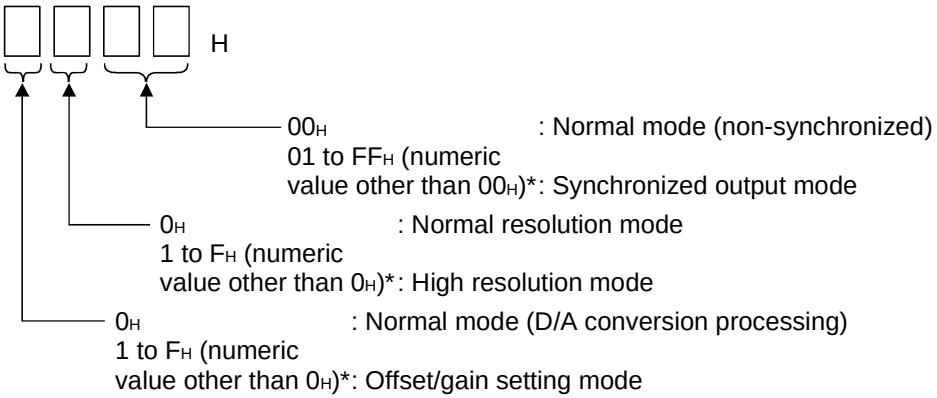
(3) For Q68DAIN



*1 Use a twisted two core shielded wire for the power wire.
*2 If there is noise or ripples in the external wiring, connect a 0.1 to 0.47μF25V condenser between the V+/I+ terminal and COM.

5.3 Switch setting for intelligent functional module

The settings for the intelligent function module are performed using the I/O allocation settings for the GX Developer. When the intelligent function module switches are not set, the default value for switches 1 to 5 is 0.

<table>
<tr><th></th><th colspan="2">Setting item</th></tr>
<tr><td>Switch 1</td><td>Output range setting
(CH1 to CH4)
 
</td><td rowspan="2"><table>
<tr><th>Analog output range</th><th>Output range setting value</th></tr>
<tr><td>4 to 20 mA</td><td>0H*1</td></tr>
<tr><td>0 to 20 mA</td><td>1H</td></tr>
<tr><td>1 to 5 V</td><td>2H</td></tr>
<tr><td>0 to 5 V</td><td>3H</td></tr>
<tr><td>– 10 to 10 V</td><td>4H</td></tr>
<tr><td>User range setting</td><td>FH</td></tr>
</table></td></tr>
<tr><td>Switch 2</td><td>Output range setting
(CH5 to CH8)
 
</td></tr>
<tr><td rowspan="2">Switch 3</td><td>For Q62DAN and Q64DAN
 
</td><td>HOLD/CLEAR function setting
0H : CLEAR
1 to FH
(numeric value other than 0H)* : HOLD</td></tr>
<tr><td>For Q68DAVN and Q68DAIN
 
</td><td>HOLD/CLEAR function setting
0 : CLEAR
1 : HOLD</td></tr>
<tr><td>Switch 4</td><td colspan="2"> 
</td></tr>
<tr><td>Switch 5</td><td colspan="2">0 : Fixed</td></tr>
</table>

* Setting any value within the setting range will provide the same operation. When the setting range is 1 to FH, set 1 for example.

Point

(1) Depending on the type of module used, the settings for D/A module output range are shown below.
- Q62DAN, Q64DAN .... 0H to 4H, FH
- Q68DAVN ..... 0H, 2H to 4H, FH

∗1: When the setting is 0H, the output operating range swill be 1 to 5 V.

- Q68DAIN..... 0H, 1H, FH

(2) For Q62DAN and Q64DAN, leave the switch2 vacant.

(3) For Q68DAVN and Q68DAIN, the switch 3 will set in binary.
Setting will be easy if the input format is changed to binary number.

Example) For setting CH3, CH5 and CH8 to HOLD.

Input format	Binary	Hexadecimal
Setting value	10010100	94 H

(4) If the offset/gain setting mode is set using intelligent function module switch 4, other settings by switch 4 (settings for resolution mode and synchronous output mode) will be ignored.

(5) Perform the offset/gain settings after checking the RUN LED flashes in offset/gain setting mode. If the RUN LED does not flash, check to see if the switch 4 setting is correct.

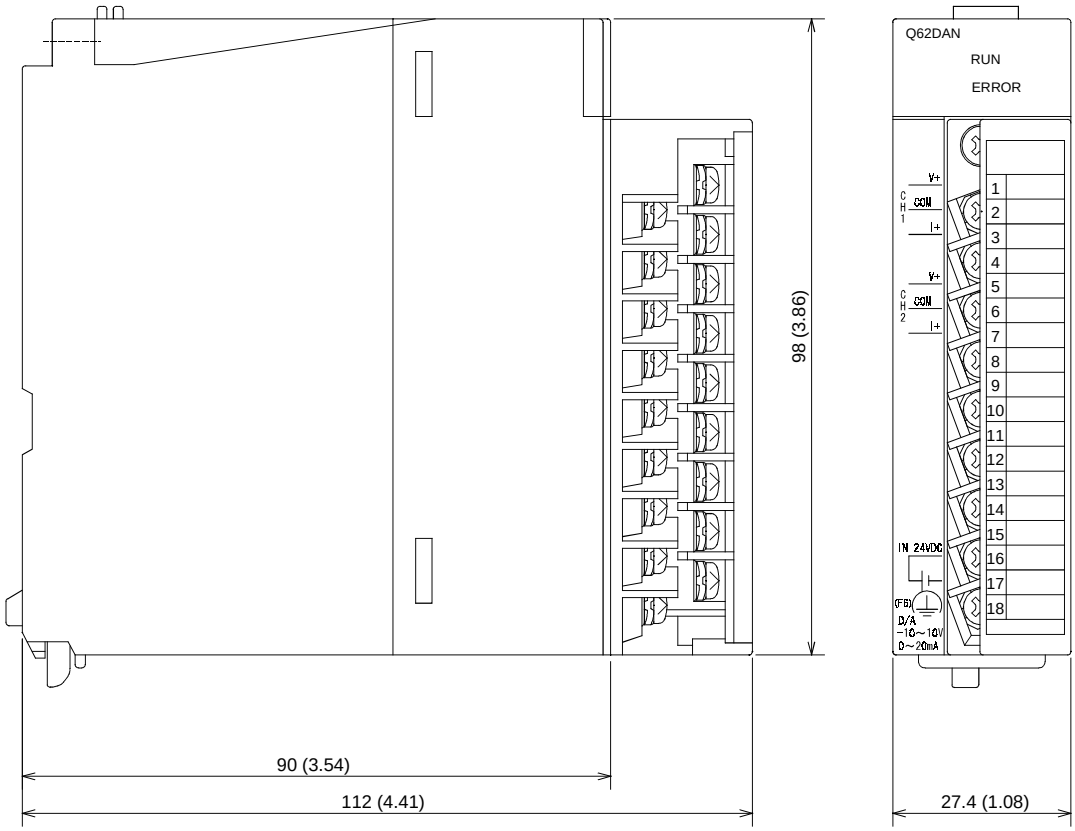
(6) Since the analog output value will differ considerably, depending on the resolution mode setting, thoroughly check the settings for the intelligent function module switches before performing the analog output processing.

Example) Analog output value when the setting range is -10 to 10V and the digital input value is set to 4000.

	High resolution mode	Normal resolution mode
Analog output value	About 2.5 V	About 10.0 V

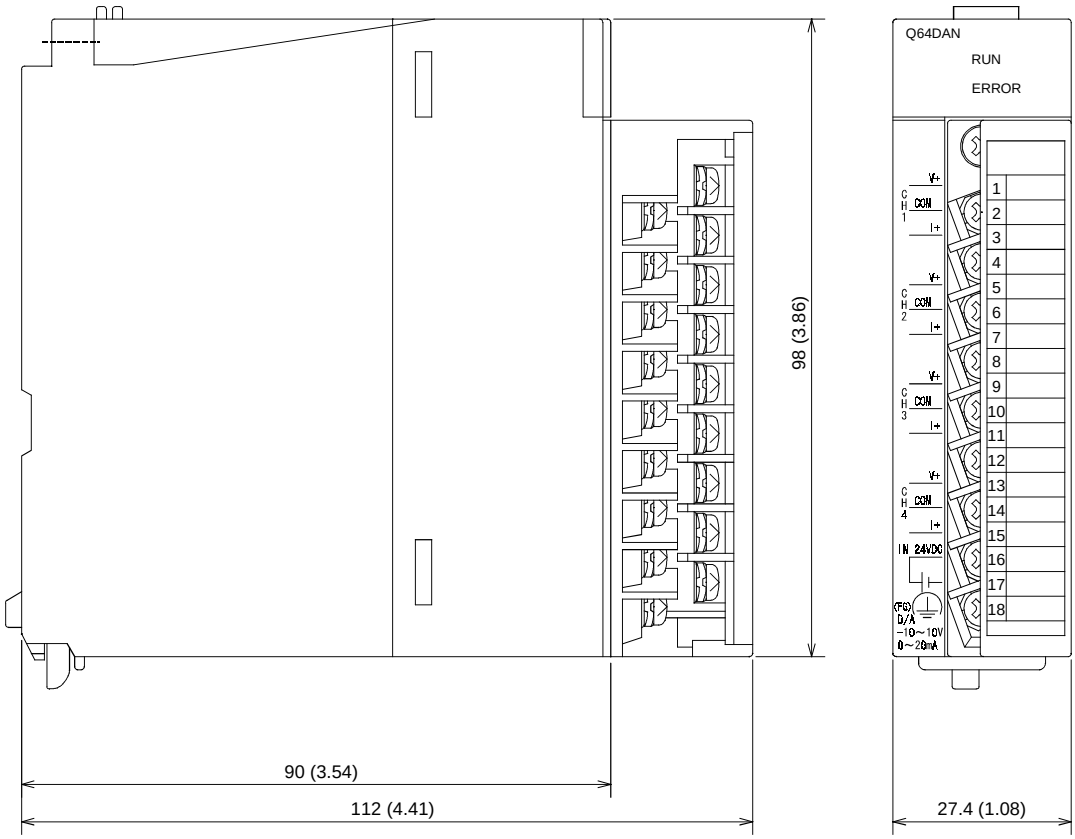
6. External Dimensions

(1) Q62DAN



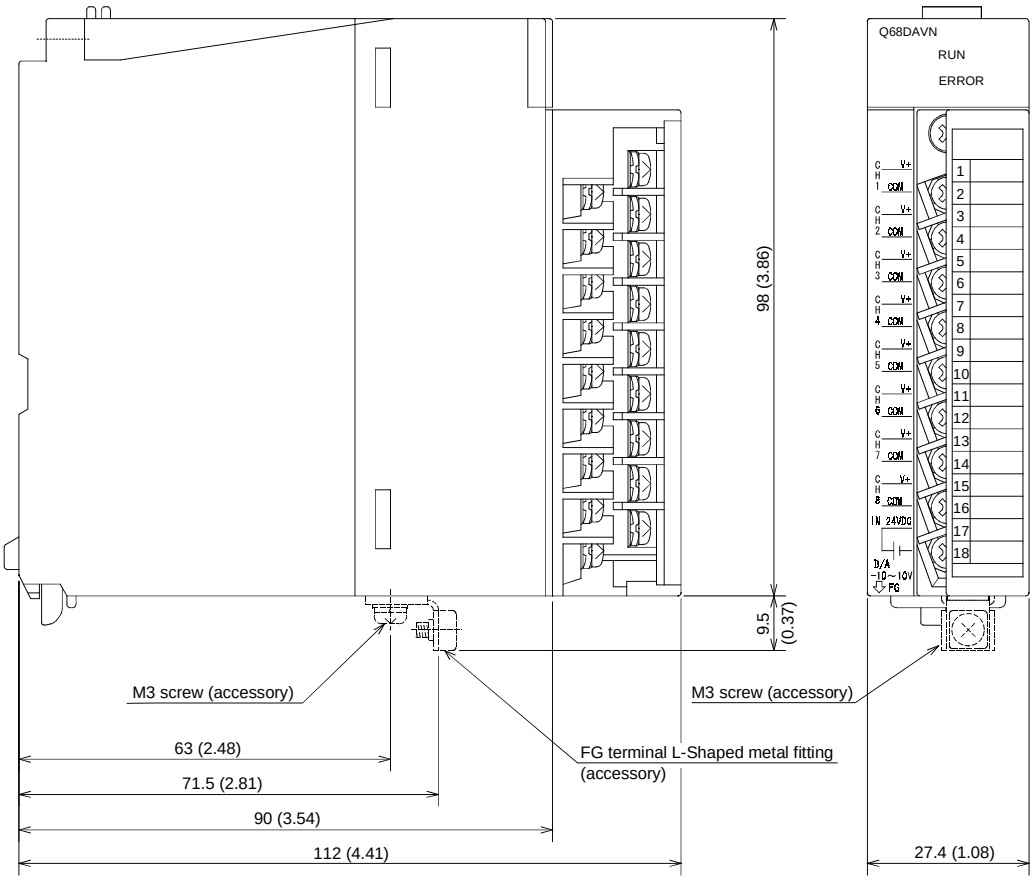
Unit: mm (in.)

(2) Q64DAN



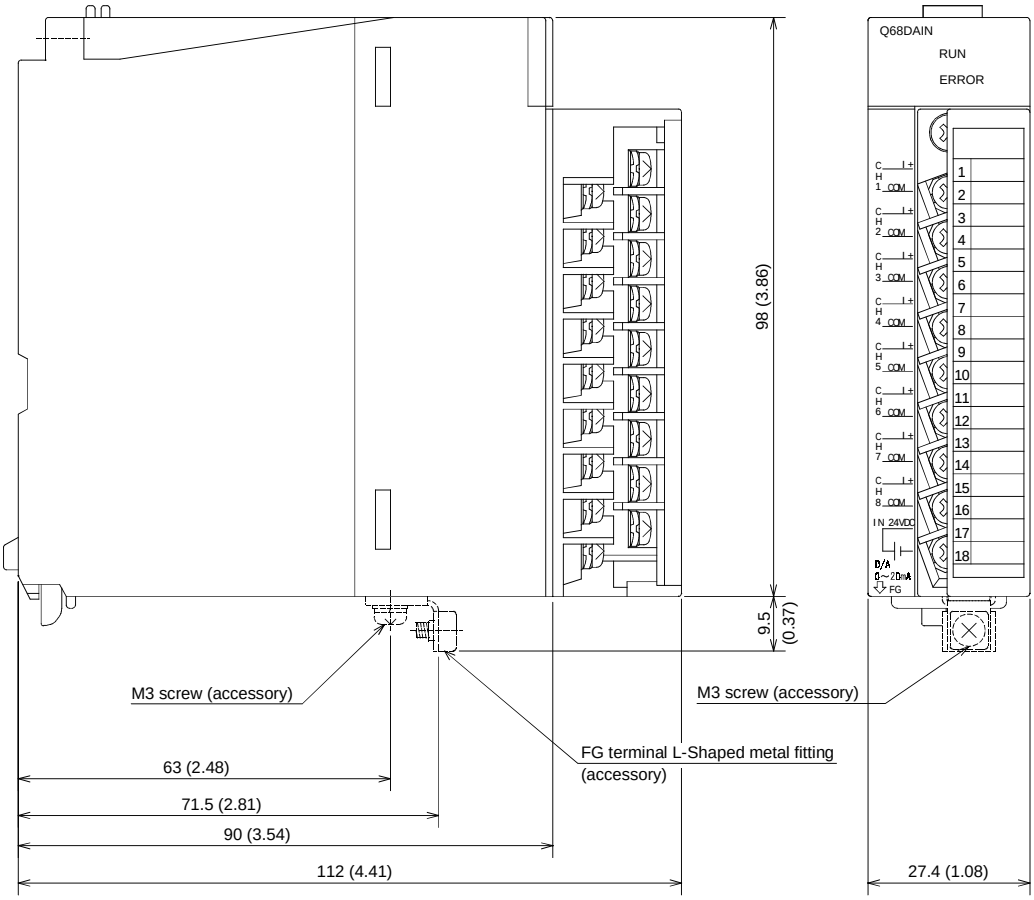
Unit: mm (in.)

(3) Q68DAVN



Unit: mm (in.)

(4) Q68DAIN



Unit: mm (in.)

Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

⚠For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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